...RD TURN

ON

AMERICAN RAILR

BY

F. A. SMITH, C. E., M. E., EDITOR ROADMASTER AND F

WITH INTRODUCTION BY

J. M. MEADE, Resident E

1966

very simple, and in order to make them still plainer, a descriptiv
hat the figure and the text are in plain view at the same time.
ook is pre-eminently designed for practical trackmen as a ready re
figures given will give excellent practical results, although fraction
ds, wherever practicable. This feature will no doubt be welcome
ert in doing the practical work than figuring it out to fractional in
to or taken from a sixty-foot lead cannot affect the correct alignme
ror in making measurements are materially reduced by simplifying
er special feature of this work is the uniform method pursued in
switches the starting point can be taken either from the frog or tl
e theoretical lead is always used, always divided in four equal part
points from the lead rail to the switch rail for all switches. Th
ays—namely, the 3 ft. 6 3-8 in. and the 2 ft. 3-4 in., must, howev
on here will affect the line of the curve materially.
er novel feature is a simple rule to determine the number of crotch

and with as much accuracy as an expert in the business.

A foreman or others engaged in track work must remember that modern and progressive ide calling are the stepping stones to success, and they can hardly expect advancement without show ability for a higher and more responsible position.

During an experience of over twenty years in active charge of maintenance of way, I have seen of the same compass that contains anything like so full and detailed description of turnouts and switch book gives. It has one very unique merit over other such works—that is, it will never become antiq

I regard it as a very complete and comprehensive work, and think that it should be in the hand one engaged in track maintenance.

J. M. MEADE, Res. E

Oct. 25, 1898. Atchison, Topeka and Santa F

ıve examined the data and diagrams for turnouts herewith publish
\MERICAN ROADS.

s fills a long-felt want, and should be in the hands of every track fc
ı required in a very plain, simple and intelligent manner, and leave:
litate the work, save waste of time and material, and give uniformi
as a tendency to attract the attention of track foremen, and the m:
supplied with a copy by the company, if the foreman does not feel
ıation given is so concise and plain that there should be no ques
. I take great pleasure in recommending it to all those interested

RICHARD CA

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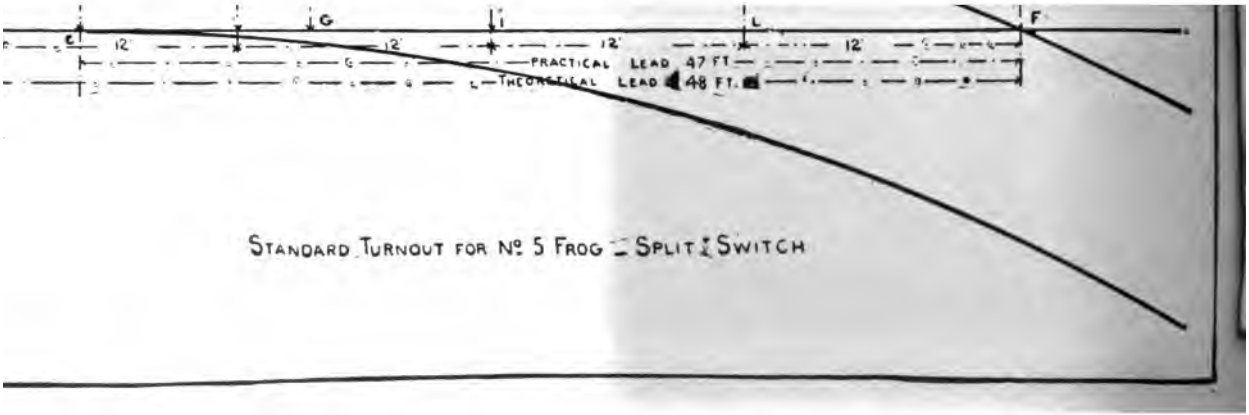
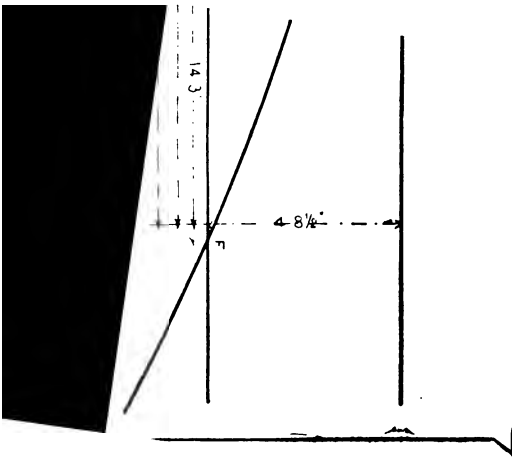


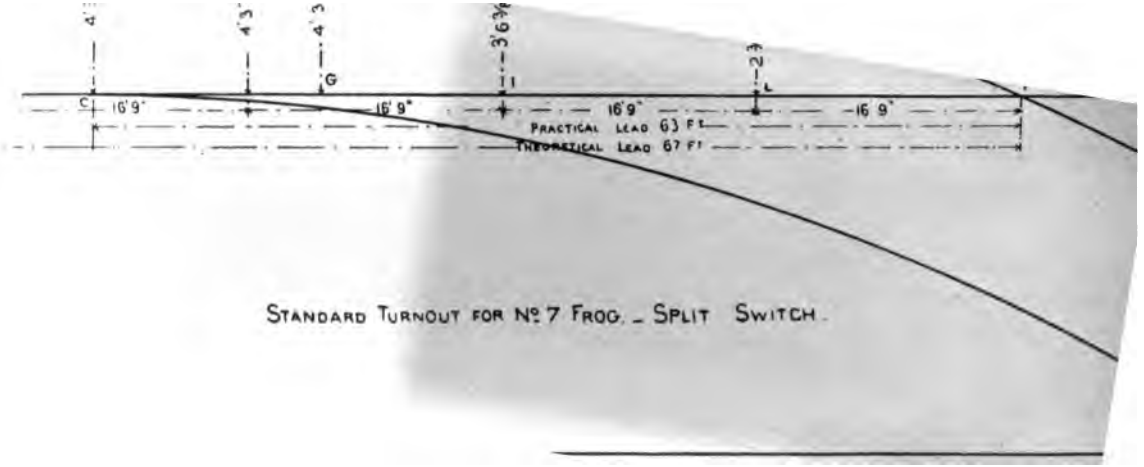
STANDARD TURNOUT FOR Nº 5 FROG — SPLIT SWITCH

point I 24 feet from A and the point L 12 feet from the Frog Point F ; then measure the distance I J
ft. 6⅜ in. plus width of railhead and L K exactly 2 ft. ¾ inches plus width of railhead square across fr
flange of lead rail A F ; then the turnout curve can be easily put in by lining from the heel H of th
point to the points J, K and F, the outer flange of turnout rails passing through points J and K. The
G H at the heel of the Switch is 4 ft. 3 in., but depends somewhat on the size of rail; there should
enough to couple the point rail to the turnout rail and to permit of spiking. The stockrail should be ben
inches ahead of point C, between A and C, to permit the Switch point C G to form a continuous line
lead A F ; after the line H J K F has been put down the outer half of turnout is put in proper line by


14 3
8½"

SPLIT SWITCH FOR NO. 6 FROG.

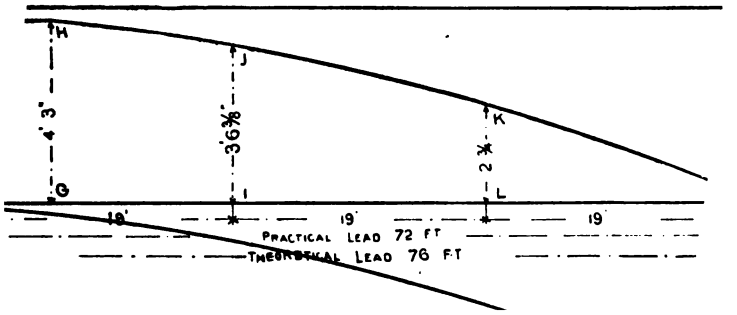
actical lead or distance between Frog and Headblock C F is 55 ft. 6
om frog point one-quarter this distance, or 14 ft. 3 in., to point L,
1 from I on inside flange of lead rail square across measure 3 ft. 6⅜
m L square across to K 2 ft. ¾ in. plus width of rail head. Then
l of switch rail H through the points J, K and F, and aft-
properly aligned by the use of th-

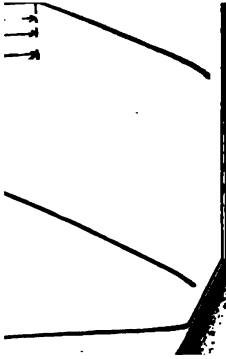


STANDARD TURNOUT FOR No. 7 FROG. - SPLIT SWITCH.

SPLIT SWITCH FOR NO. 7 FROG.

The practical lead in this case is 63 feet and the theoretical lead 67 feet, so begin at Frog point F
sure toward switch 63 feet, which will give you the location of the headblock C D, and from C to A
feet, which will be the theoretical point of turnout curve; from frog point F measure 16 ft. 9 in. to L,
point L to I measure also 16 ft. 9 in.; then from I to J measure 3 ft. 6⅜ in. square across from lead r
so from point L measure to K 2 ft. ¾ in. to K square across, marking the points J and K and line
out curve from heel H of switch rail E H, through the points J, K and F. It must be understood tha
nces, I G and L K, given in diagram, means from gauge line to gauge line, but this distance is ea
sured from the inside flange of lead rail C F to outside flange of turnout rail H F by adding the widt
lead; so when measuring the distances I J and L K do so from inside flange of lead rail; if, for instance,
rail is 2⅛ in. wide, make the distance I J 3 ft. 8½ in., and L K 2 ft. 2⅞ in.; then the points J and K
orrect for the outside flange of the turnout rail H F.

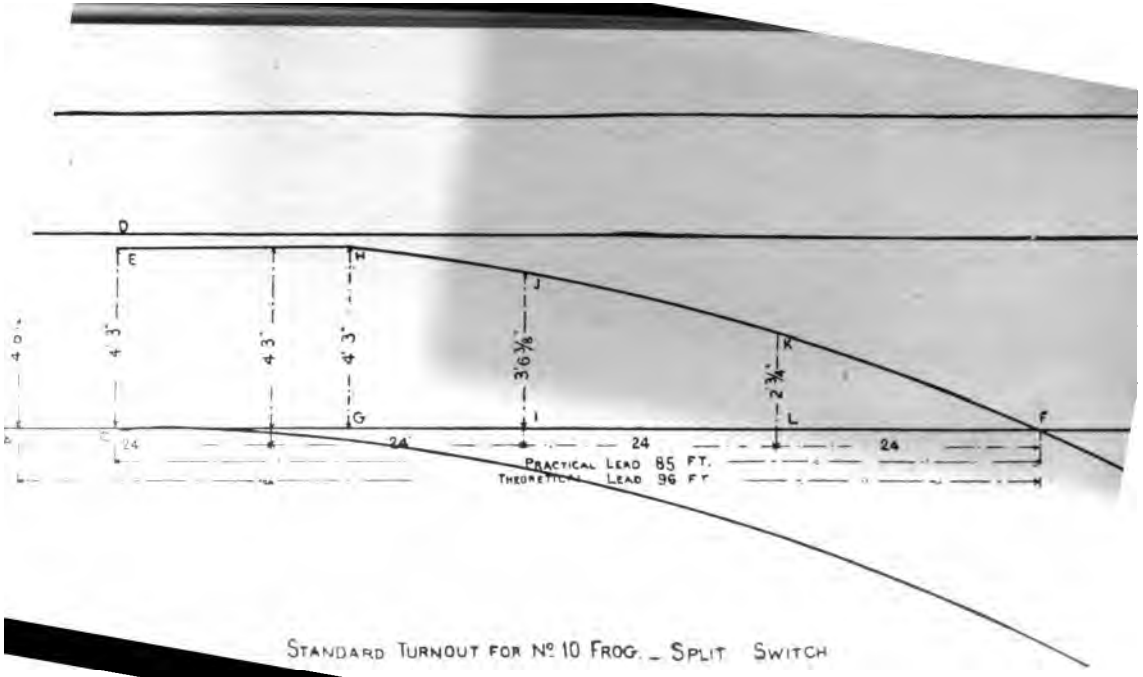

H
J
K
4' 3"
3'6⅜"
2⅜"
G
I
L
19'
19'
19'
PRACTICAL LEAD 72 FT
THEORETICAL LEAD 76 FT



ead rail at L measure 2 ft. ¾ in. plus width of rail head for
outside flange of turnout rail H F, which can thereby be put i
rail E H through the points J, K and F; compare notes on
switch, which fixes the point H according to the size of the ra
the inside by the use of the gauge.

STANDARD TURNOUT FOR Nº 9 FROG. - SPLIT SWITCH

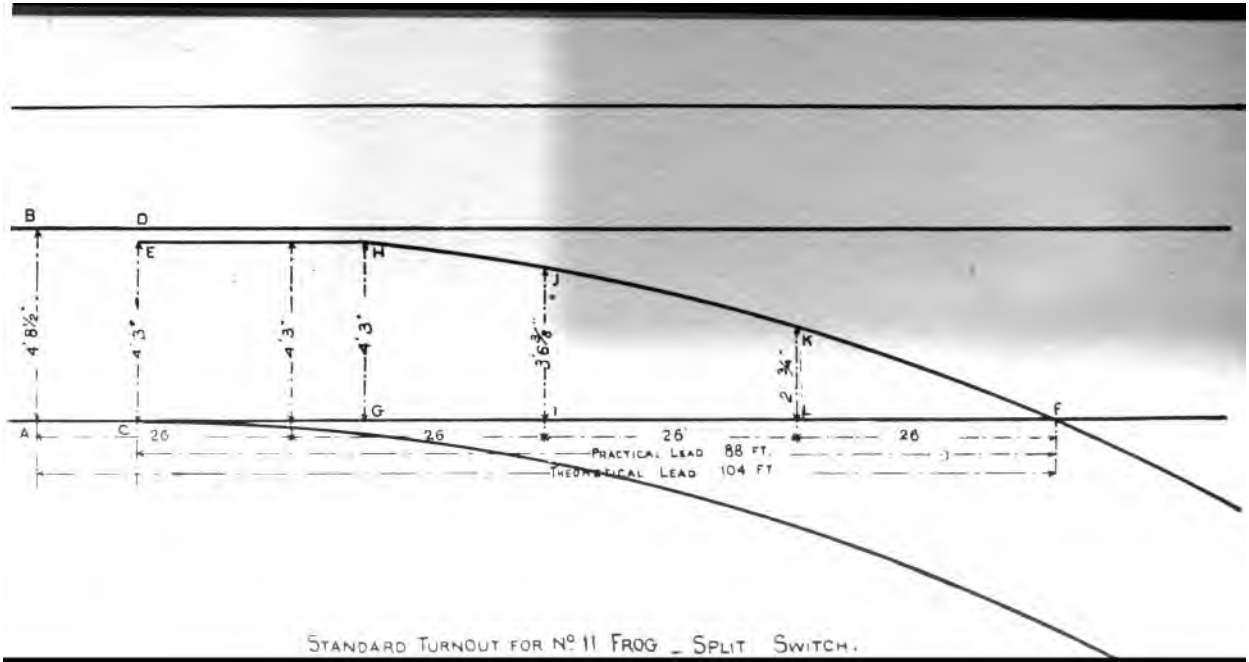
; kind of turnout is used very much, because it gives a lead not too
practical or shortened lead is 76 ft. 6 in., and the theoretical lead is
g point is known, measure from F toward headblock 76 ft. 6 in., w
measure toward headblock 21 ft to get point L, and from L toward
the point I; to locate the points J and K, proceed as explained on
to the distances shown in diagram, measuring from inside flang
ide flange of lead rail at L square across; then the points J and K
the distance G H at heel of switch is approximate-



STANDARD TURNOUT FOR Nº 10 FROG. _ SPLIT SWITCH

SPLIT SWITCH FOR NO. 10 FROG.

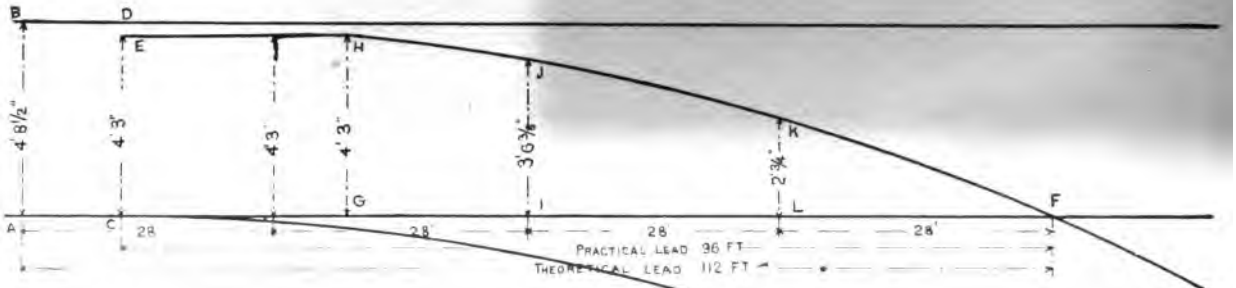
This kind of a turnout is also in extensive use, giving a somewhat longer lead, but a much ea and gives good satisfaction in passing-track switches. The practical lead is 85 feet and the theoreti feet; to begin at the headblock C E, for instance, measure 85 feet along lead rail to locate frog point F toward headblock measure 24 feet (one-fourth of theoretical lead), which gives point L, and t measure another 24 feet: then locate points J and K by measuring from inside flange of lead rail across to J 3 ft. 6⅜ in. plus width of railhead, also from inside flange of lead rail at L square across ¾ in. plus width of railhead; then the turnout curve is easily aligned through the points H, J, K and care that the outside flange just passes through the points J and K. The point F in all these diagr theoretical point of frog, and in setting the frog the foreman must make allowance for the bluntn real frog point.



STANDARD TURNOUT FOR Nº 11 FROG _ SPLIT SWITCH.

SPLIT SWITCH FOR NO. 11 FROG.

In this case the practical lead is 88 feet and the theoretical lead 104 feet. As the reader has al
served, it does not matter whether to start from the headblock or the frog when laying out the turno
ing from the frog point F, measuring 88 feet along lead rail locates the headblock, or starting from
block and measuring 88 feet toward F locates the frog point; from point F toward headblock measu
(one-fourth of theoretical lead), which locates point L, and from L toward headblock measure anothe
which gives point I; then locate points J and K by adding width of railhead to distances shown ir
and explained on preceding pages, and then line up the turnout curve by the points H, J, K and F; v
is done the outer part of switch is lined up by the aid of the gauge. The stockrail A C should be ben
inches ahead of point of switch to such an angle that opposite H G its gauge line is exactly 4 ft. 8½ in.
gauge line of E H.

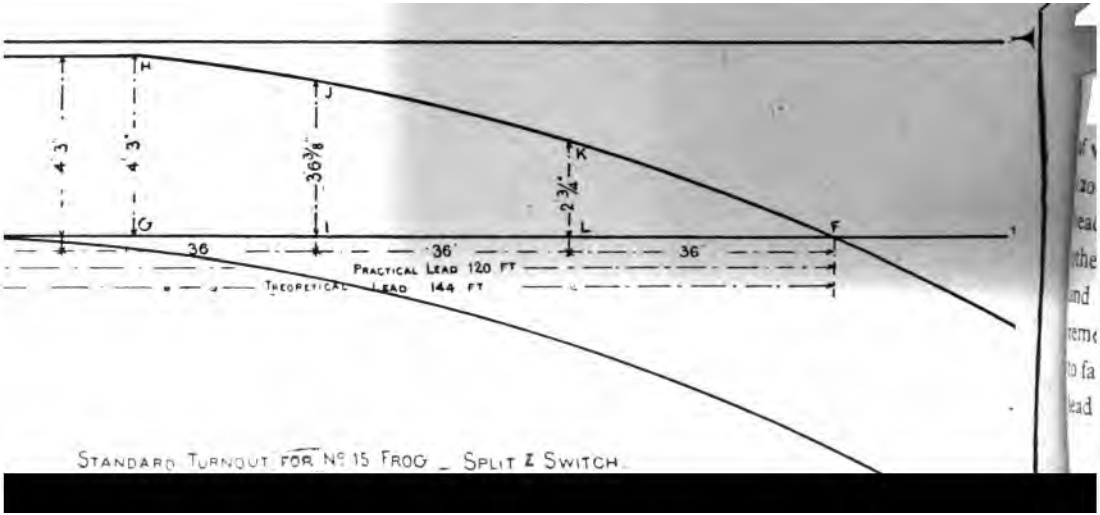


STANDARD TURNOUT FOR Nº 12 FROG. SPLIT SWITCH.

SPLIT SWITCH FOR A NO. 12 FROG.

The diagram on the opposite side shows the general arrangements; the practical lead is 96 feet theoretical lead is 112 feet long. Measure from frog point F toward point of switch 96 feet, which giv of headblock. The theoretical lead commences 16 feet ahead of switch at A B. From point F measure headblock 28 feet (one-fourth of theoretical lead), which locates the point L, and from L to I measure feet; then measure from I to J 3 ft. 6⅜ in. plus width of railhead, and from L to K measure 2 ft. ¾ width of rail. Then proceed as explained on preceding pages, and line turnout curve so the outer flang through the points J and K. The stockrail should be bent about 9 inches ahead of point C, so that i line is exactly 4 ft. 8½ in. from gauge line of point rail E H opposite heel of switch at G H.

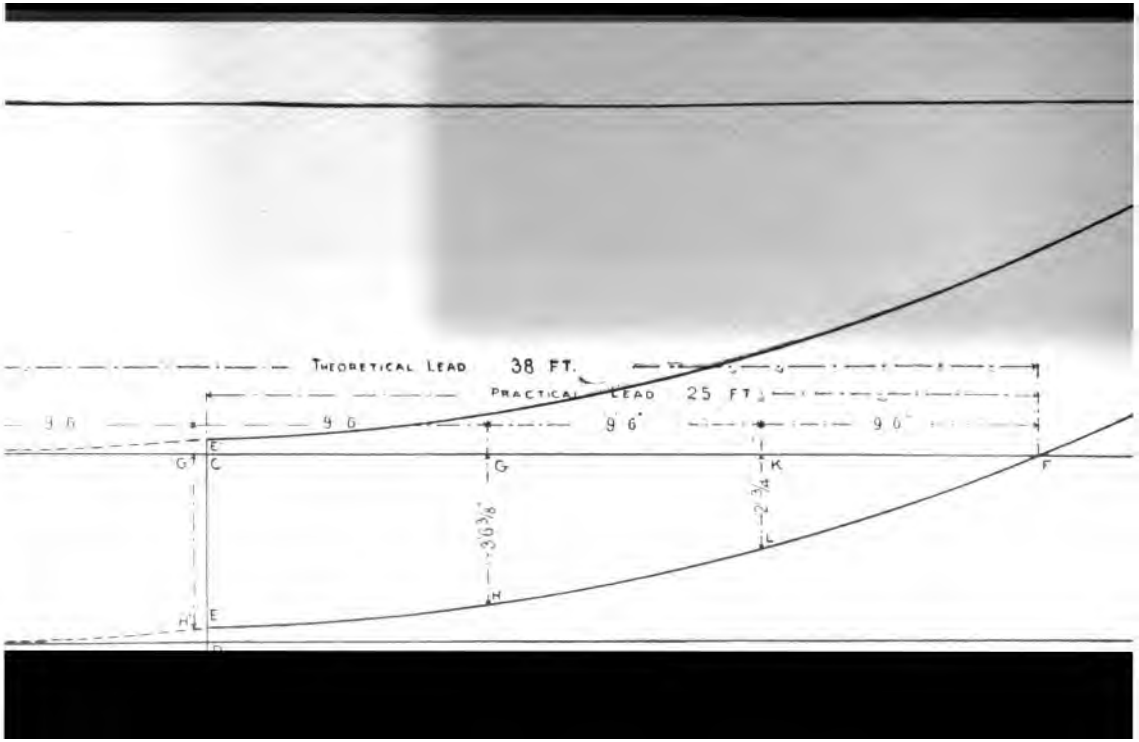
This is a very desirable switch for turnouts over which trains have to pass with high velocitie turnout curve is only 4¼ degrees.



STANDARD TURNOUT FOR No 15 FROG _ SPLIT Z SWITCH.

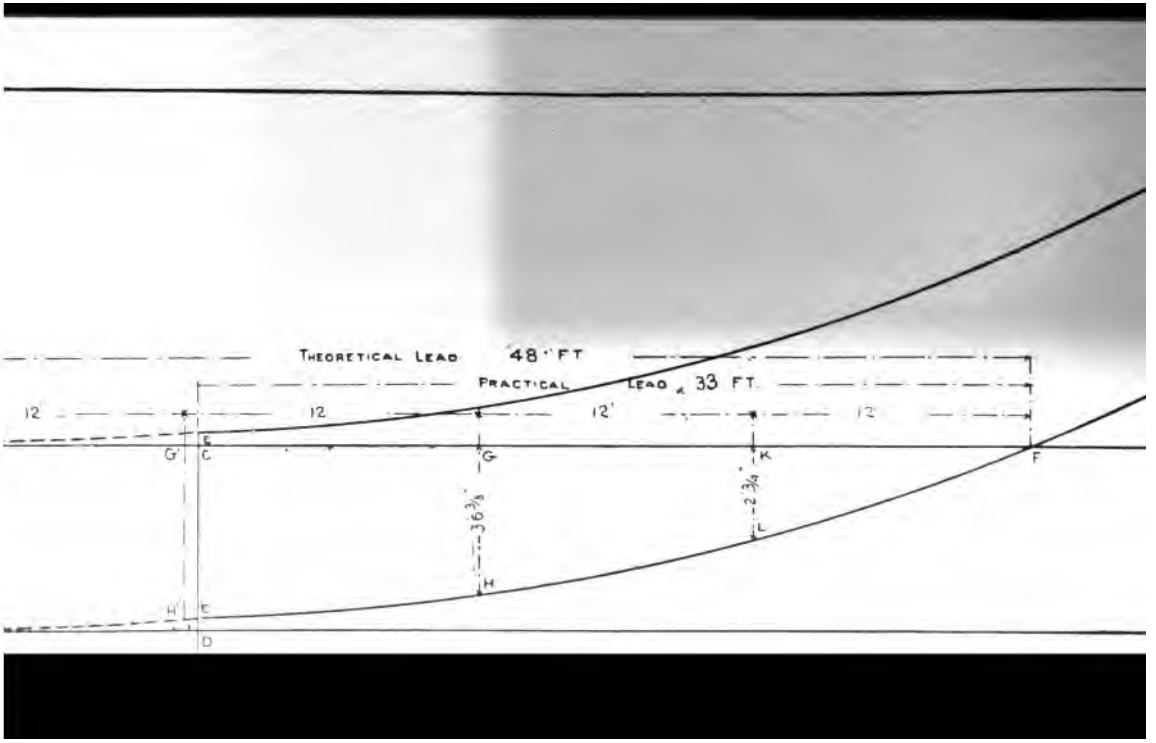
SPLIT SWITCH FOR A NO. 15 FROG.

This switch has been adopted recently by some of the Eastern trunk lines to further facilitate th
of very fast trains over turnouts. The curve is only slightly more than 2½ degrees, but the practic
20 feet, and the theoretical lead is 144 feet long. To locate, therefore, the frog point F, measure 120
eadblock; then measure 36 feet (one-fourth of theoretical lead) back for the point L, and from L me
her 36 feet for the point I. Add the width of railhead to the distances I J and L K, shown on oppo
d locate the points J and K. Then line up turnout curve from heel of switch H through points J,
nembering that the outside flange of rail is to touch the points J and K; if the points J and K shoul
ll between ties, drive a stake in the ballast at the proper point; if they fall on ties, mark them wi
pencil, or drive down a tack.


THEORETICAL LEAD 38 FT.
PRACTICAL LEAD 25 FT.
9 6
9 6
9 6
9 6
E
G'
C
G
K
F
30 3/8"
2 3/4"
H
H'
E
D

STUB SWITCH FOR NO. 4 FROG.

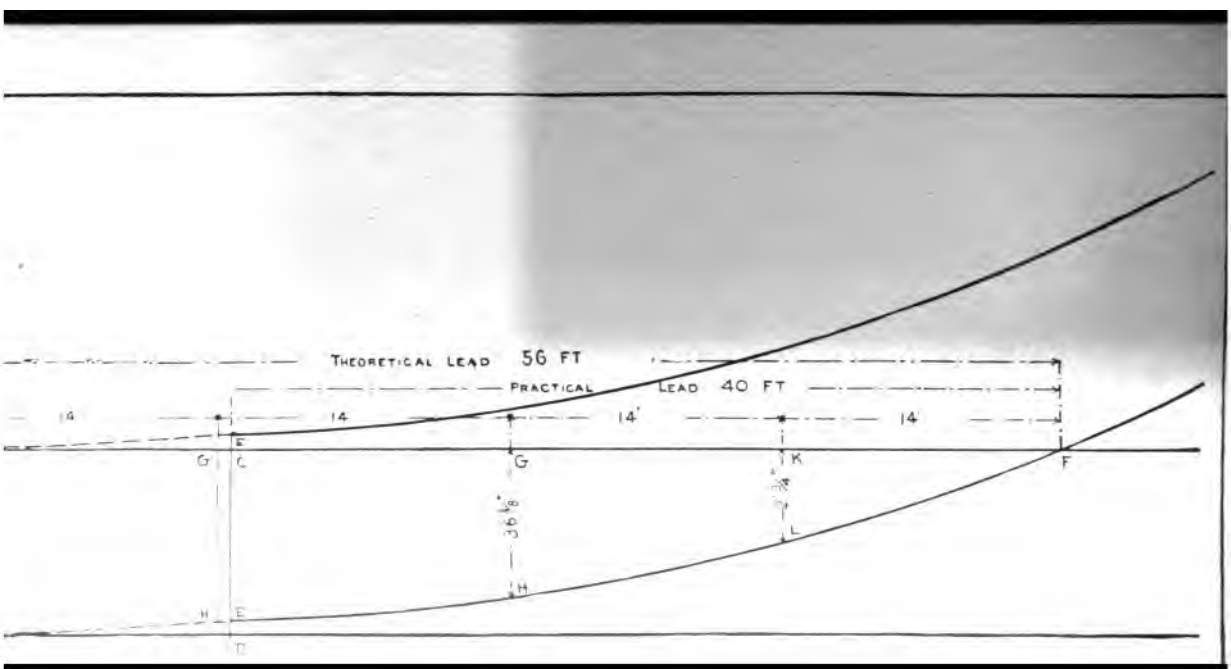
The switch shown on opposite page is used occasionally in very crowded yards, where circu will not permit of a longer turnout; the resulting curve is nearly 39 degrees, which will be too sharp motives to go around, even at very slow speed. To locate the headblock D C, measure 25 feet from cal point of frog F along lead rail F C; the theoretical length of lead is 38 feet; the throw of the swit sumed for all sub-switches in this book at 5 inches; as the throw D E or C E increases, the prac decreases, and as the throw decreases, the practical lead lengthens somewhat. To line up this turno ure from F to K 9 ft. 6 in. (one-fourth of theoretical lead), and from K to G again 9 ft. 6 in.; then fro side flange of lead rail at G measure 3 ft. 6⅜ in. plus width of railhead square across to point H, inside flange of lead rail at K measure 2 ft. ¾ in. plus width of railhead square across to point I.; ther will be points of the turnout curve, and the outer flange of turnout rail should touch H and I. The d A E and B E show the length of the moving rail, which should be left unspiked 13 feet, the point representing the theoretical beginning of turnout curve.


THEORETICAL LEAD 48 FT
PRACTICAL LEAD = 33 FT.
12
12
12
12
G'
E
C
G
K
F
3 6 3/8"
2 3/4"
L
H
H'
E
D

STUB-SWITCH FOR A NO. 5 FROG.

This switch is also used for crowded yard work, but gives much better results than a No. 4 f curve of turnout is 24½ degrees, which is still too sharp for general traffic; the practical lead, or fro block to frog point, is 33 feet, and the theoretical lead is 48 feet, thus making the unspiked part of the rail 15 feet. From F (frog point) toward headblock measure 12 feet (one-fourth of theoretical lead), t point K, and from K to G measure also 12 feet. From the inside flange of the lead rail at G lay off 3 ft plus width of railhead square across, which locates the point H; also from the inside flange of lead r measure 2 ft. ¾ in. plus the width of railhead square across to L; then we have four points to line the curve by—namely, from head chair at E through H and L to frog at F. Remember that the outside turnout rail must just touch the point H and L.

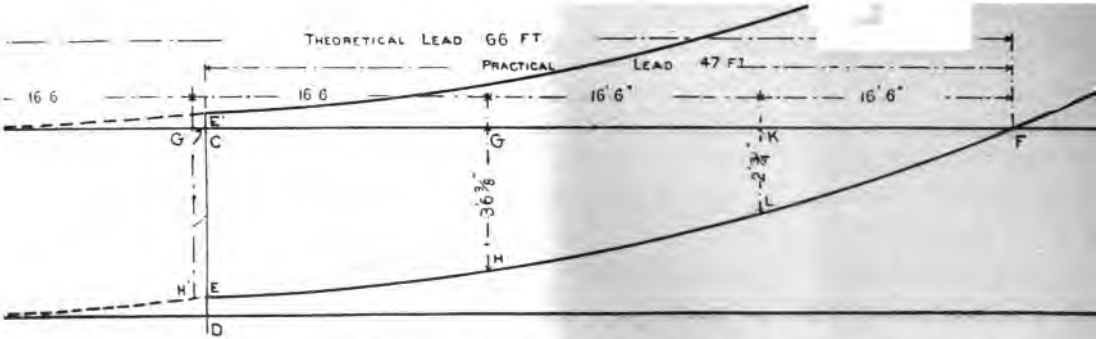
This is for a 5-inch throw; for a 5½-inch throw the practical lead should be 32 feet, but the th lead remains the same.


THEORETICAL LEAD 56 FT
PRACTICAL LEAD 40 FT
14
14
14'
14
E
G'
C
G
K
F
3.6"
3.6"
L
H
H
E
D

STUB SWITCH FOR A NO. 6 FROG.

This switch is more generally used in crowded yards, and permits engines of all descriptions t
r it; it has a curvature of 17 degrees; its practical lead from headblock to frog is 40 feet, and the the
l is 56 feet long. This makes the unspiked portion of the switch rail A C 16 feet long. To lay this
, and starting from the frog point F, measure 40 feet to C or lead rail, which gives center line of hea
n from F toward C on lead measure 14 feet, which locates point K, and from K toward headblock n
in 14 ft., which gives point G. Now, to fix the points H and L, proceed as explained on the preceding
asure from inside flange of lead rail at G 3 ft. 6⅜ in. plus width of railhead square across, which gi
nt H, and from the inside flange of lead rail at K measure 2 ft. ¾ in. plus width of railhead square
ich fixes point L. Then line up the turnout curve from headchair E, the outside of rail flange touc
l L, and couple to Frog at F.

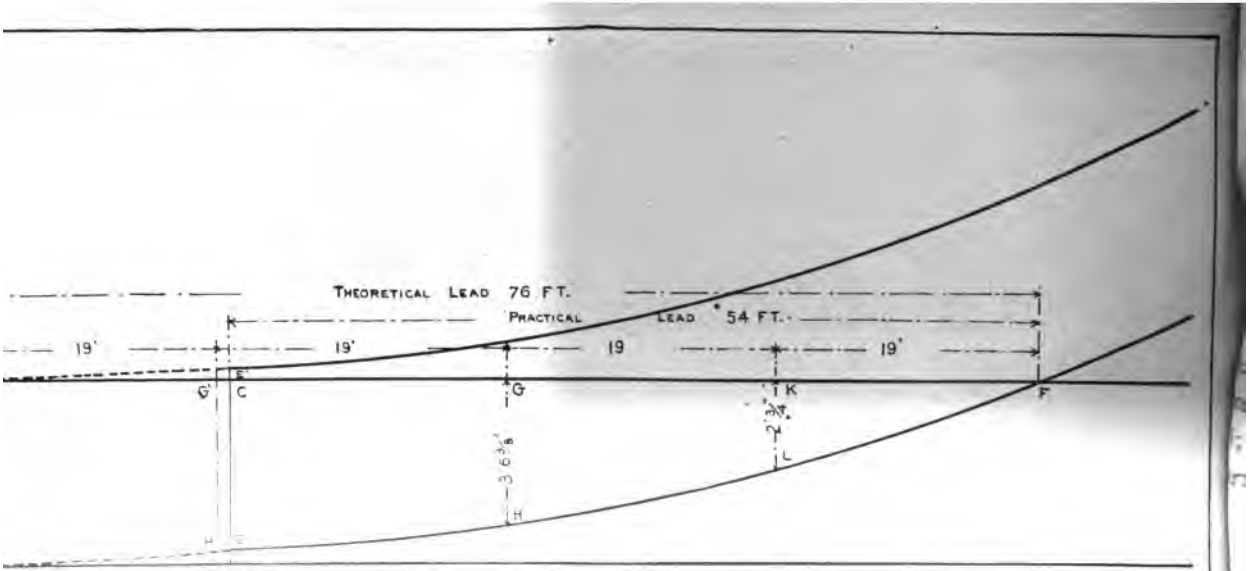
The above regulates the putting in of a stub switch, if the throw is 5 inches; for a 5½-inch thr



STANDARD TURNOUT FOR Nº 7 FROG — STUB SWITCH.

STUB SWITCH FOR A NO. 7 FROG.

vature of this switch is about 12½ degrees; the lead from headbl
is 66 feet; this makes the length of the moving rail 19 feet; so if t
d, and the 19 feet adjacent to headblock should be loose. If the h
ire 47 feet along lead, which locates the frog point F; from F tow
es point K, and from K lay off again 16 ft. 6 in. (one-fourth of th
measure from inside flange of lead rail at G 3 ft. 6 3/16 in
es the point H; also from the insid

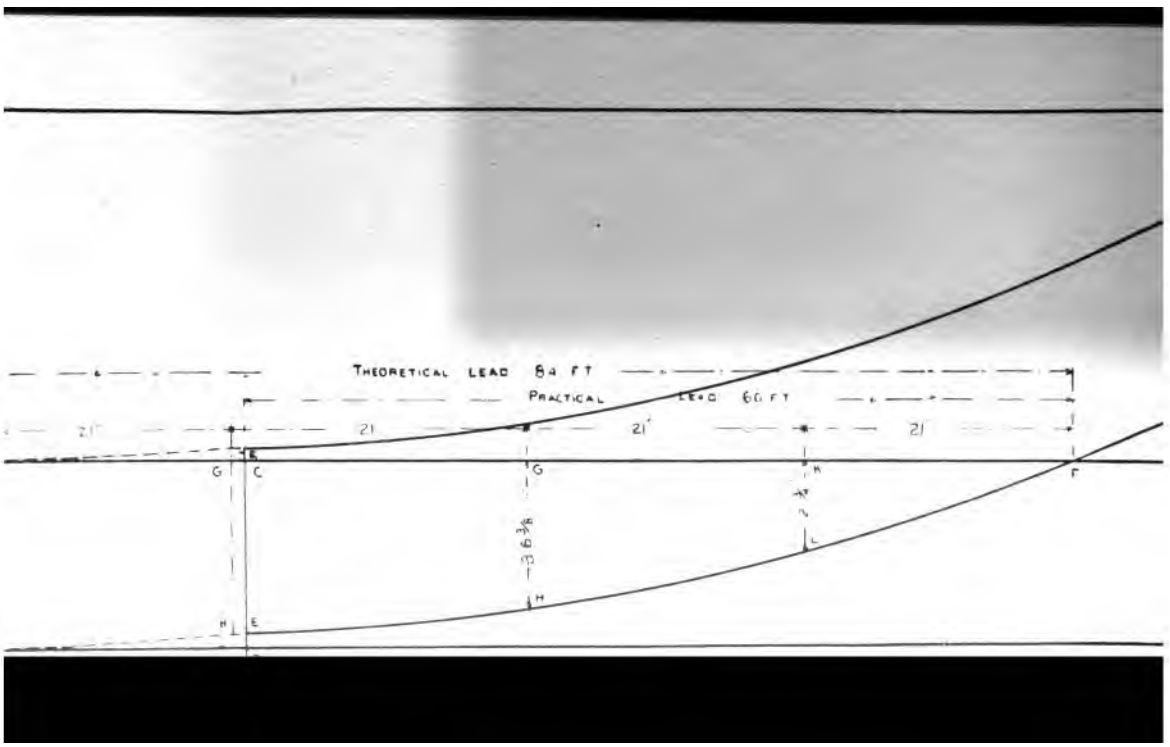


STANDARD TURNOUT FOR Nº 8 FROG. _ STUB SWITCH

STUB SWITCH FOR NO. 8 FROG.

The curvature of this turnout is 9½ degrees; the practical lead is 54 feet, and th
nce from frog to headblock is therefore 54 feet, and the length of the movable swi
: of a 30 feet spiked. To lay out the turnout, measure from frog point F 19 ft.
for the point K, and from K toward headblock on lead another 19 feet, which fix
'om inside flange of lead rail C F at point G 3 ft. 6⅜ in. plus the width of railhea
so at point K on inside flange of lead rail measure 2 ft. ¾ in. plus width of railhea
ut curve can be lined up, starting from headchair E through the points H and L t

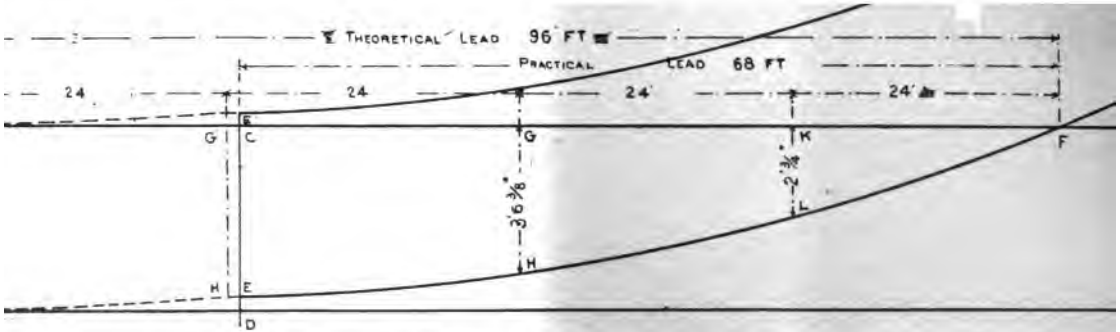
For a throw of 5½ inches the practical lead should be 52 feet, and for a 5¾ in.


THEORETICAL LEAD 84 FT
PRACTICAL LEAD 60 FT
21'
21'
21'
21'
G
C
G
H
F
E
H
L
H
E

STUB SWITCH FOR NO. 9 FROG.

This turnout is used more than any other one, particularly on Western roads; the curvature is
and the practical lead from headblock to frog point is 60 feet; the theoretical lead is 84 feet. The
movable switch rail should therefore be 24 feet, which, however, can safely be shortened to 23 fee
7 feet well spiked, which provides sufficient stiffness at the heel of switch. To lay out the tu
re from frog point F toward headblock 21 feet (one-fourth of theoretical lead) to point K, and fr
ne distance (21 feet) to point G. From G measure 3 ft. 6⅜ in. plus width of railhead to po
m point K measure 2 ft. ¾ in. plus width of railhead to point L, measurements to be started from
f lead rail, as explained on preceding pages; then line turnout curve, beginning at headchair I
hing points H and L with outside flange of turnout rails.

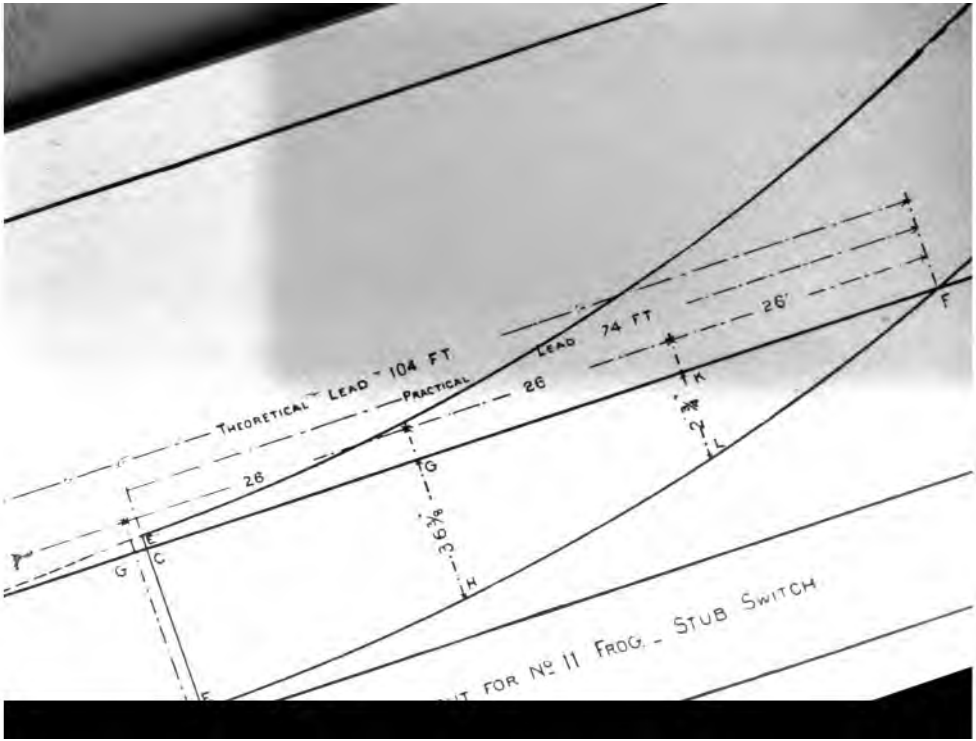
ıe practical lead for a 5½ in. throw is 58½ feet, and for a 5¾ in. throw 58 feet; the theoretica
he same—namely, 84 feet.



Standard Turnout for No. 10 Frog - Stub Switch

STUB SWITCH FOR NO. 10 FROG.

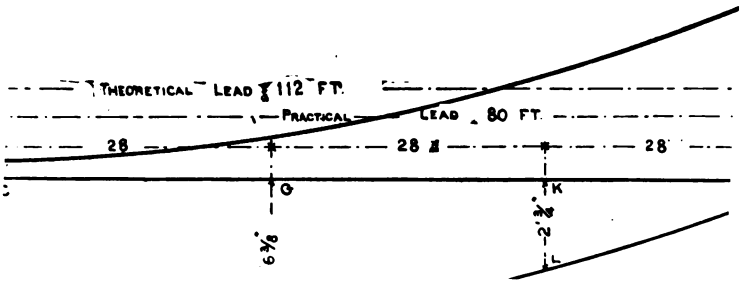
In this turnout the practical lead from headblock to frog point is 68 feet, and the theoretical l feet; this would make the theoretical length of unspiked switch or moving rail 28 feet, which is t where rails are only 30 feet long, since the switch rail should be spiked for at least 4 feet; hence 25 fee spiked will make a good enough switch rail. To put in the turnout, measure from frog point F 24 fourth of theoretical lead) along the lead to point K, and from K measure again 24 feet to point G. Th the inside flange of lead rail at point G measure 3 ft. 6⅜ in. plus width of rail head square across, wh point H, and at point K on the inside flange of lead rail measure 2 ft. ¾in. plus width of rail head squa to point L. Now the turnout curve can be put in without any trouble by the aid of the four points E, F; it must be remembered that the outer flange of turnout rail must just touch the points H and L. thing to be looked after is that as the length of switch rail increases, the number of switch rods mus increased; thus for Nos. 4 and 5 frogs, 3 rods; for Nos. 6 and 7 frogs, 4 rods; for Nos. 8 and 9 frogs, 5 r Nos. 10, 11 and 12 frogs, 6 rods should be used.


THEORETICAL LEAD - 104 FT
PRACTICAL LEAD 74 FT
26'
26
26
3.6%
G
H
K
L
F
C
E
G
FOR Nº 11 FROG. - STUB SWITCH

STUB SWITCH FOR NO. 11 FROG.

This turnout is not used extensively, but is added to the book for uniformity and completene practical lead is 74 feet and the theoretical lead is 104 feet; this would make the moving rail 30 feet since at least 4 feet of the switch rail should be spiked, 26 feet will answer very well. To lay out th measure from frog point F toward headblock 26 feet to point K, and from K toward headblock 26 fee gives point G. From the inside flange of lead rail at G measure 3 ft. 6⅜ in. plus width of railhead squa to point H; also from inside flange of lead rail at K measure 2 ft. ¾ in. plus width of railhead to point the turnout curve can be lined up correctly from the headchair through points H and I. to frog F, flange line passing through the points H and I.

The shortening of the length of moving rail from 30 feet to 26 feet has evidently the effect of i the curvature of the switch from A to C, so while the curve between headblock and frog is only 5 deg 7½ degrees between headblock and point of switch A B.


THEORETICAL LEAD 112 FT.
PRACTICAL LEAD 80 FT.
28
28
28
G
K
6 3/8"
2 3/4"

style of turnout is not often used, for the reason that, althou
4 1-5 degrees, the curve of the moving rail will be over 7 degr
naterial to go beyond a No. 10 frog, as long as we have no rails
et, the theoretical lead 112 feet; hence the switch rail should be
n F toward C 28 feet to get the point K; from K measure again
of lead rail at G measure 3 ft. 6⅜ in. plus width of railhead, w
f lead rail measure square across 2 ft. ¾ in. plus width of railhe
adily lined up now, beginning at headchair E, passing th
turnout rail is just to touch point

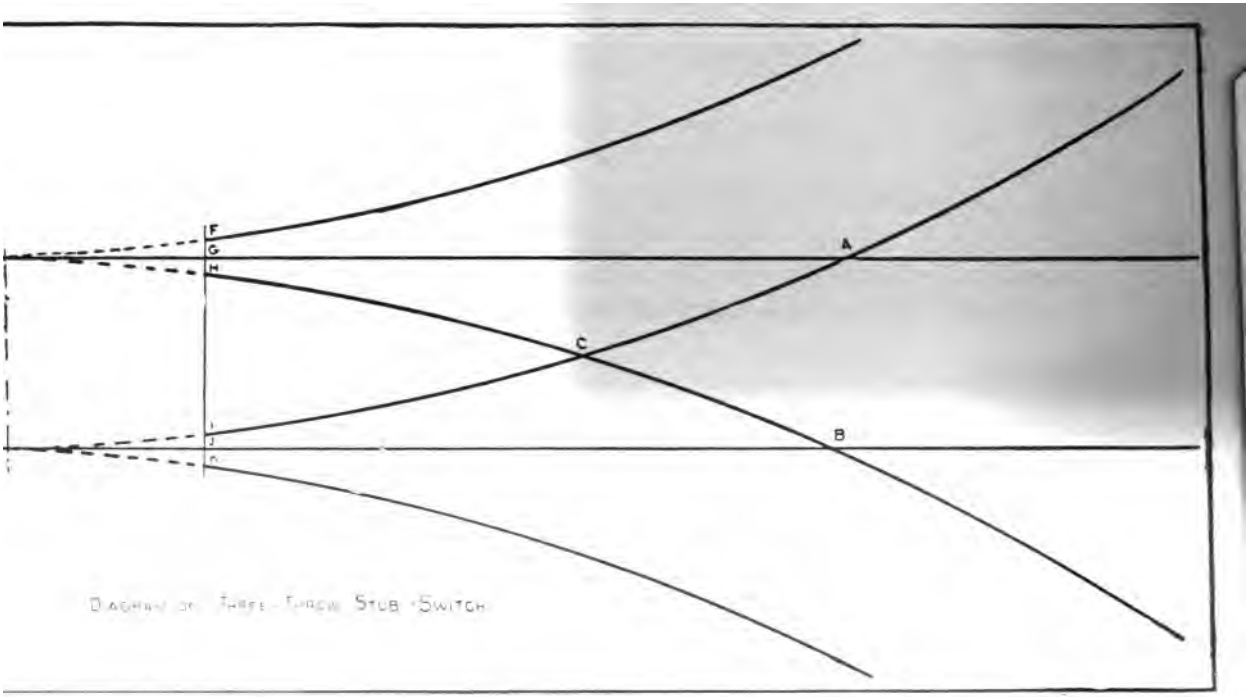
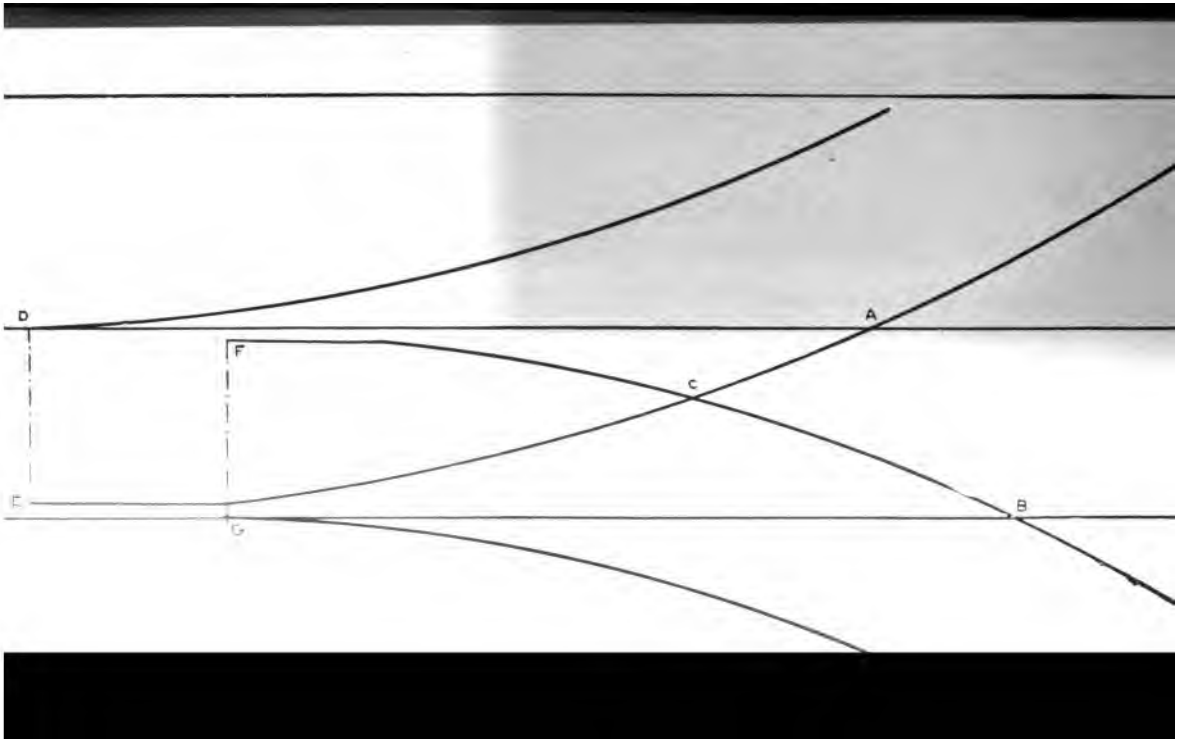


Diagram of Three-Throw Stub Switch

THREE-THROW STUB SWITCH.

The cut on opposite side is a general diagram of a three-throw Stub Swit
the two side frogs, and C is the point of Crotch frog; F K is the headblock and D
swing rails D G and E J can be thrown by the same switch stand in three differ
outs starting from the same headlock require but one switch stand and one set of
frog C and a special set of headchairs; to put in a three-throw stub-switch, proc
pages, to lay out each switch independent of each other, and where the turnout
be the point of Crotch frog. A simple rule to determine the number of the Crotcl
numbers of the two side frogs together and divide by 3; thus, if B is a No. 8 ar
plus 10 equal 18, which divided by 3 gives 6, which is the number of Crotch frog
side frogs is not evenly divisible by 3, take the nearest full number; for instance,
frog; here we have 13 divided by 3 equals 4 1-3, hence the Crotch frog should


D
A
F
C
E
B
G

THREE-THROW SPLIT SWITCH.

Concisely speaking, there is no such thing as a three-throw Split Switch, since each Split Sv its own headblock and switch stand, but we understand under three-throw Split Switch what is in the diagram on the opposite page, where two turnouts cross each other, requiring an extra frog C ; t combination of two such split switches, lay out each one independent of each other, according to the ins given in preceding pages ; where the two turnout curves intersect is the point of Crotch frog C T rule given on preceding page for finding the number of Crotch frog C is also good in this case ; for in is a No. 7 and B is a No. 7 Frog; 7 plus 7 make 14, divided by 3 make 4 2-3, or nearly 5, hence C sh No 5 Frog; or suppose A is a No. 12 and B a No. 10 Frog, then C should be a No. 7 Frog, because

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